SCIENCE

NEW YORK, JANUARY 29, 1892.

THE AMERICAN ASSOCIATION OF INVENTORS AND MANUFACTURERS.

FEW occurrences of public interest have recently taken place which have been of greater moment to the people and to the nation as a whole, and few have attracted less public attention than that which was held in Washington in answer to the call of Mr. Watkins, on the 19th of January,—the meeting of the American Association of Inventors and Manufacturers. Organized a year ago, nearly, and composed of inventors like Dr. Gatling, Mr. Charles F. Brush, E. E. Sickles; business men like Mr. Gardiner G. Hubbard and Oberlin Smith; public men like General Butterworth and O. T. Mason; and scientific men like Professors Anthony and Thurston, and backed by the Commissioner of Patents, this association should have some interest for the people at large and for the journalists who represent the people. Its first meeting was opened by the president and attended by the whole bench of the Supreme Court, and its addresses during its several days' sessions were given by the most distinguished men of science and greatest inventors of the country.

The purposes of this organization are declared to be: To promote the progress of science and useful arts (Constitution U. S., i., 8). The diffusion of practical, scientific, and legal information respecting inventions. The encouragement of favorable and the discouragement of unfavorable laws respecting property in patents. To secure the co-operation of foreign inventors for reciprocal regulations under patent systems. The proper, just, and adequate protection of the rights of American inventors authorized by the Constitution of the United States. Any person in sympathy with the objects of the association is eligible to membership under conditions stated in the constitution upon the payment of a membership fee of five dollars for the first year. No initiation fee is charged. To the executive council, composed of the seven officers and the nine directors of the association, has been assigned the duty of completing the organization, begun with so much earnestness at Washington.

Its first meeting was held on the centennial of the signing by George Washington of the first patent law of the United States, the beginning of national industrial prosperity. As is well said in the call lately issued for the second meeting:—

"The celebration of the beginning of the second century of our American patent system was the outgrowth of a spontaneous desire to recognize publicly the benefits which that system has conferred upon our nation and upon the world.

"Eminent inventors, statesmen, and scholars from all parts of the Union met together to express their appreciation of the merits of that system, which has lightened the toil of the farmer, shortened the working hours of the mechanic, added to the safety of the miner, and lifted the burden from the household drudge.

"The monument then erected on the boundary line between two centuries, embellished by the best thoughts of such gifted minds, will endure so long as the libraries of the world shall preserve the record of their tribute to American genius.

"While existing laws have encouraged and do now stimulate the creation of intellectual property and do throw safeguards around its ownership, yet the fact remains that neither the real inventor nor the author has been adequately protected in his rights.

"This state of affairs has resulted from the fact that the inventors of the country have never thoroughly organized themselves for mutual protection nor brought concerted effort to bear upon their representatives in Congress, to the end that proper laws should be enacted, nor have they heartily supported the officials of the Government in their attempts to secure adequate facilities for carrying out present regulations. Hence the system, even as it exists, has been preserved with great effort, and even now is handicapped by some conditions that are not encouraging.

"It may be true that the patent system, in a few instances, has had an unfavorable effect upon certain sections of the country and upon some occupations, and that some owners of useful patents have demanded greater profit for their inventions than was consistent with the public good. But such evils, if they exist, can best be remedied by intelligent discussion among those who have a vital interest in the things themselves.

"The people at large and their representatives need to be impressed with the fact that it is to the epoch-making inventions of the century that our country owes its high position among the civilized nations of the world."

The patent system so auspiciously inaugurated by the greatest and first of our presidents has been intermittently promoted and sometimes obstructed in its operation by that alternation in power of friends and enemies — or lukewarm friends — which so generally characterizes the action of a popular government, and that of the United States no less than those of minor countries. In its best estate, however, it has never done the best that it might for either the inventor or the nation. During the last few years, its operation has been shamefully embarrassed and the interests of the country have been greatly injured, while those of the inventor and his rightful claims upon the country have been no less seriously affected, in consequence of the utter neglect of this great department by Congress, and the refusal of the national legislature to provide it with respectable quarters and sufficient working force.

In many cases, applications of immense importance to the industrial interests of the nation have been kept in the office for many months, through the utter inability of the working force to keep itself up with the business of the office.

The annual report of the Commissioner of Patents to Congress dated Jan. 1, 1891, calls attention to the lack of sufficient examining force and to the need of more office room. The commissioner remarks that "the pace kept up in the patent office now, as in all recent years, is inconsistent with that high degree of care which the patent system calls for," and that "a patent should evidence such painstaking in examination that upon its face it should warrant a preliminary

injunction, and there can be little doubt that the continuance of the 'American' examination system depends upon so conducting examinations into the novelty of alleged inventions as to make the seal of the patent office a powerful, if not conclusive, presumption that the patent is valid."

The commissioner further reports that "during the past year the patent office has earned a surplus, over every expense, of $241,074.92, and the total balance to the credit of the patent fund now in the treasury of the United States is $3,872,745.24, and that the inventors of the country cannot understand why the government takes their money and then fails to provide necessary facilities."

Such a state of affairs is simply a disgrace to the country and to the committees of Congress entrusted with the care of this great instrument of national advancement. The work of the association should be forwarded by every citizen and promoted by every journal in the land. The indifference of the members of the committees of Congress having charge of the business interests of the country can only be accounted for by the fact that the people, and especially the business men of the country, who should continually consult with and direct these committees, pay no attention to this branch of legislative work. Were these committees carefully made up of men well-posted in the work entrusted to them, and were they kept up to their duty by the pressure of public opinion, the prosperity of the nation would be vastly better assured than now.

SOME RECENT MINERAL DISCOVERIES IN THE STATE OF WASHINGTON.

WHEN I visited Washington Territory in the autumn of 1887, I found great activity among the prospectors in the mountainous region lying near the Canada line, and between the Cascade Range and the Bitter Root division of the Rocky Mountains; also in the Cœur d'Alene region. Many fissure veins carrying gold, silver, lead, zinc, copper, etc , had been discovered, and tested sufficiently to prove their richness. In some cases the precious metals were associated with iron carbonates, but more commonly with iron sulphides, galena, and lead carbonates. Chlorine, antimony, and zinc were also found in combination. Copper was found both native and combined. The gangue was usually quartz, with which is often associated what is called "porphyry." The country rocks are granite, quartzite, argilite, and limestone.

On my return to the country in 1891 (now the State of Washington) I found that there had been no loss of reputation in respect to any of the mining localities; but that in all except the Cœur d'Alene and Colville regions the development of ores had been retarded by the lack of transportation.

In 1887, the Cascade Range proper, though rich in the purest magnetite along its crest, and in the Cretaceous lignites along its flanks, was not regarded as a promising field for the discovery of the precious and base metals. A few small veins of low grade silver, gold, and copper ore had been found among the iron bearing rocks about the head springs of the Snoqualmic River, but nothing to compare with the developments on the waters of the Methow, Okinagane, Kootenai, Cœur d'Alene and upper Columbia, on the east of the Cascade Range. But during my visit to the State last autumn I found an army of prospectors and miners at work on a group of veins running along the western flank of the Cascade Range. This group or belt so far as discovered is about fifty miles long and fifteen miles wide (perhaps twenty miles wide), and occupies the eastern edge of Snohomish and Skagit Counties. The region is drained by the upper waters of the Skagit, Stillaguamish, and Skykomish Rivers. The veins are well-defined fissures carrying gold, silver, lead, copper, and sulphur with iron, antimony and arsenic in quartz and porphyry; in other words, the same sort of veins as those found in eastern Washington. Usually they follow the course of the country rocks, but with the usual branching and flexing.

The country rocks, which consist also of granite, quartzite, and slate (I saw no limestone) usually stand nearly vertical, though in some places inclining eastward with a dip as low as thirty degrees. The general trend of both country rocks and ore veins is a little more to the north-east than that of the irregular crest-line of the main mountain. Hence they all cross the mountain at a sharp angle immediately north of the Cascade Pass, the name given to the notch at the head of the Cascade River, which is one of the chief affluents of the Skagit River. This locality has within two years become famous as the "Cascade Mining District." Here have been opened numerous veins of auriferous pyrites and argentiferous galena. The veins are broken across by a deep gorge, whose steep sides are striped by the disclosed vertical edges of the veins. Of course, in many places the outcrops are concealed by soil and vegetation, but the mountains rise three to four thousand feet above the gorge (six to seven thousand feet above Puget Sound), and the upper third is bare rock, and numerous denuded spaces extend much lower. The physical conditions are favorable for prospecting, mining, concentrating, and moving. The mountain on the north side holds near its summit two small glaciers: the lower one I named the Silver Queen, the upper one the Skylight. Snow slides and running gravel are uncomfortably common on these heights. But safe camping ground can always be found in the evergreen forests on the mountain sides. So much for the north end of this mineral belt.

The other leading mining district is at the south end of the belt, and is known as the Silver Creek District on one side of a dividing ridge, and the Monte Cristo District on the other side. Silver Creek is a tributary of the Skykomish River, and has its head in Silver Lake, a beautiful little sheet of water nestling among the evergreens in a groove of one of the lofty outliers of the main range. The creek, after running in its elevated trough for two or three miles suddenly begins to pitch down a steep escarpment, and falls a vertical distance of two thousand feet in three miles of surface measurement, and falls fifteen hundred feet more in the next five miles, at the end of which it joins the north branch of the Skykomish River. Its course is southerly.

The Monte Cristo District is made by a continuation eastward of the veins of the upper half of the Silver Creek District, which pass through the water-shed into the valley of the Sauk River, a tributary of the Skagit. Taking this part of the mineral belt across its widest part it measures at least twelve miles, probably more. The ores do not differ materially from those of the Cascade River country, and the veins stand on each side of the gulches, offering every facility to the miner. Not less than thirty distinct veins (or ledges) have been uncovered, and many tunnels of several hundred feet in length have been driven horizontally The best "rich streaks" are of argentiferous galena, which in a few cases are as much as four feet wide (generally much less), and carry from thirty to three hundred ounces of silver to the ton.

This new mineral region is as yet but very partially ex-

amined. It is, however, a permanent addition to the vast mining territory of the Rocky and trans-Rocky Mountain country, and when considered in connection with previous discoveries, it suggests the probability that the mineral deposits of the State of Washington exceed in quantity and value those of any other State.

W. H. RUFFNER.

Lexington, Va., Jan. 23.

THE EVOLUTION OF THE LOUP RIVERS IN NEBRASKA.

THE most casual inspection of a map of central Nebraska might suggest that the hydrography of the region has probably undergone radical changes. It looks as if the three Loup rivers, and the smaller creeks running parallel to them, had once been separate tributaries of the Platte, all independent of each other, as roughly indicated by the dotted lines on the map (Fig. 1). The Platte is the great central trunk of the drainage, and these streams all seem to be headed for it like branches, and would join it directly if they had not been somehow turned eastward and united to form the Loup River.

It is the fate of such impressions to fade out in the light of accurate knowledge, but there are some survivals, and this

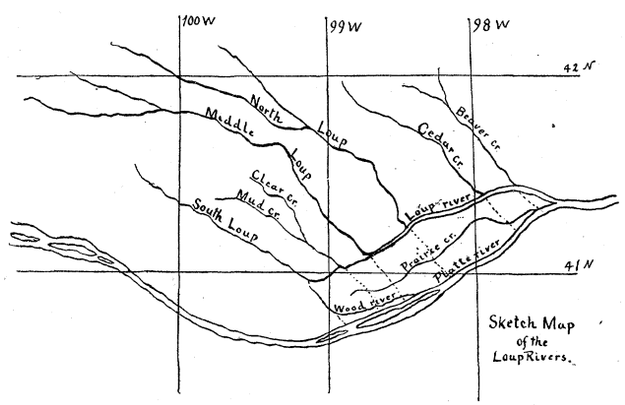

FIG. 1.

bids fair to be one of them. I have, I think, verified it by field work, and I will briefly recount some of the topographic and geological data which tend to confirm the first impression.

The Loup rivers flow in channels excavated from fifty to two hundred feet in soft tertiary marls. Taking them in succession from south-west to north-east each stream is lower than the preceding one. A profile on a line at right angles to the general south-east course of all the streams of the Loup system, would have the general character roughly represented in Fig. 2.

This general north-east slant of the country gives a great advantage in rapidity of erosion to all ravines on the south-west side of each stream. They become longer, deeper, carry more water, and are cut down more rapidly than those on the north-east side of the next higher stream, because they run with the slope of the country and have a lower outlet. Thus the space between the streams is captured by the more vigorous headwater erosion of the north-easterly tributary. Presently a branch more vigorous than the rest captures the headwaters of its neighbor lying to the south-west. This imparts still greater vigor of attack, and the succeeding captures in the same direction are hastened.

The latest robbery in the Loup system is that of the headwaters of Wood River. Journeying down from the headwaters of the South Loup one is impressed with the apparent continuity of its valley with that of Wood River, rather than with that of the South Loup itself below Callaway. It is obviously an instance of the lower, more easterly stream cutting through the divide and drawing to itself the headwaters of the higher one.

This series of captures by lower tributaries is exhibited on a grand scale and in a mature form in the Loup system. Another example on a smaller scale, and in its incipient stages, is shown in Fig. 3. The streams *a* and *b* have each captured the headwaters of some streams lying westward, and *a* threatens to capture the headwaters of *b*.

In this case, on the Republican River, the slant of the country is directly east, and is due to the Rocky Mountain upheaval, which gave an eastward tilt to the great plains.

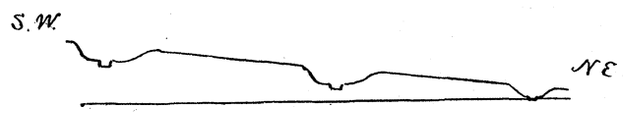

FIG. 2.

In the Loup region there is also, in addition to the eastward slope, a pitch to the north-east, which has a more local origin, but is, none the less, an important factor in the evolution of the Loup system. The last great tertiary lake (Cheyenne) submerged the Loup and the Republican completely, but left the upper Platte a vigorous mountain stream, bringing down silt at a rapid rate. This silt, quickly subsiding in the still lake waters, formed a succession of bars off the mouth of the river, as the shore line shifted east and west in the vicissitudes of climate, and of upheaval and subsidence. There was no permanent point of discharge, and consequently no permanent single bar, but a general distribution of silt in and along the channel of the Platte, which accumulated to such an extent as to raise the level of this river above that of the Loup on the north and the Republican

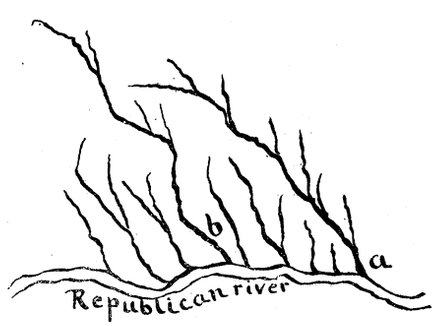

FIG. 3.

on the south. This is true in the case of the Loup, notwithstanding it is a tributary of the Platte, and the anomally is explained by the lower gradient of the Loup. The tributary is at the same level as the parent stream at the point of confluence, but the Platte falls 7.1 feet per mile and the Loup only 5.6 feet per mile. This brings the Platte rapidly above the Loup in following them upwards from the point of confluence. It is true that this lower gradient of the Loup is itself anomalous, so that I have only explained one anomaly by another. The full explanation of the second would require another article.

The natural result of excessive deposition along the Platte would be to crowd the mouths of its tributaries eastward and obliterate their old channels. Not only would they be turned to the east by the mass of silt in their former path, but

they would be crowded upon each other and unite in a main trunk almost parallel to the Platte, like the lower Loup. The two causes, headwater erosion and Pliocene channel-filling, have worked together harmoniously. The former has swept the upper courses westward by a series of captures; the latter has crowded the mouths of the tributaries eastward and made them coalesce into a single large tributary. Thus a number of separate tributaries entering the Platte nearly at right angles have been wheeled into an oblique position, and evolved into one great tributary system, whose volume rivals that of the parent stream. L. E. HICKS.

NOTES AND NEWS.

A TELEGRAM has been received announcing the illness of the Right Rev. John J. Keane, D.D., president of the Catholic University of America, and requesting that the date on which his address, before the Brooklyn Institute, on "Leo XIII. and the Social Problems of the Day" is to be given be postponed until Bishop Keane is able to come to Brooklyn to deliver it.

— Those who interest themselves in the aboriginal languages of Australia, will hear with much satisfaction that the vernacular of the natives of the MacDonnell range, South Australia, has been studied and committed to writing by their missionary, Rev. H. Kempe, who resides on the Finke River mission. His grammar and vocabulary occupy the first fifty-four pages of the Transactions of the Royal Society of South Australia (Vol. XIV., Part I., July, 1891, 12mo), a periodical edited by Professor Ralph Tate, Adelaide, W. C. Rugby, publisher.

— On the 9th of January representative scientists from the different parts of the State met in Austin, at the University of Texas, and organized a Texas Academy of Science. The officers are: president, Dr. Everhart, professor of chemistry, Austin; vice-president, Mr. Dumble, state geologist, Austin; treasurer, Professor Nagle, Agricultural and Mechanical college, Bryan; honorary secretary, Dr. Macfarlane, professor of physics, Austin; members of council, Dr. Halsted, professor of mathematics, Austin; Mr. von Streeruwitz, State Geological Survey; and Dr. Simonds, professor of geology, Austin.

— At the late annual meeting of the Iowa Academy of Science Mr. R. Ellsworth Call exhibited a remarkable specimen of the human hyoid bone, taken from a male subject. The basi-hyal was excessively irregular on the anterior surface with complete obliteration of the median vertical ridge; the anterior aspect was also somewhat concave. The right cerato-hyal was entirely wanting; the left was nearly as long as the thyro-hyal on its side, and was styliform in shape. It was completely ankylosed to the basi-hyal. On the side on which the cerato-hyal was wanting there was no evidence of any structure corresponding to the cerato-hyal and no indication of a synovial bursa or structure which would show that it had ever existed. In addition, the muscles of that side were attached to the basi-hyal, and this was believed to be the cause of the disappearance of the vertical median ridge and the cause of the roughened characters presented by the anterior surface.

— The second annual meeting of the Nebraska Academy of Sciences was held at the University of Nebraska, commencing Thursday, Dec. 31, 1891. The programme was as follows: the president's address, Specialization in Science (Dr. Kingsley being absent, the address was read by Dr. C. E. Bessey); The Slime Moulds of Crete, by A. T. Bell; The Evolution of Oxygen by Plants, by A. F. Woods; Additions to the Flora of Nebraska, by by Professor G. D. Swezey; The Flora of the Black Hills, by Dr. C. E. Bessey; Metabolism, by Dr. H. B. Lowry; A Bacterial Disease of Corn, by H. B. Duncanson; Notes on the Flora of the Artesian Well at Lincoln, by J. R. Schofield. The officers for 1892 are: president, Dr. Charles E. Bessey, University of Nebraska, Lincoln; vice-president, Professor G. D. Swezey, Doane College, Crete; secretary, W. Edgar Taylor, State Normal School, Peru; custodian, Lawrence Bruner, University of Nebraska, Lincoln; trustees, Ex-Superintendent E. T. Hartley, Lincoln, and Dr. H. B. Lowry, Lincoln.

— In a paper presented to the Iowa Academy of Sciences, recently, Miss Minnie Howe, assistant in biology in the West Des Moines High School, described a series of experiments made by her at the Iowa State University during the winter and spring of 1891, together with their results. The problem which Miss Howe attempted to solve was the separation of the *Bacterium, Bacillus subtillis*, from the yeast plant *Saccharomyces cerevisiæ* found together in ordinary soft yeast. She sought, also, to obtain pure cultures of each and to determine the part that each played in bread-making. It was found that bread made of sterilized flour and raised with the pure bacillus culture was light, but not as spongy as ordinary bread, sweet, close-grained, rather dark-colored, smelling and tasting much like "salt-raised" bread. Bread raised with the pure yeast culture under exactly the same conditions as the first was somewhat light, sweet, not so fine-grained nor as light as either ordinary bread or that made with bacteria. It had a peculiar insipid taste, with an odor unlike that of either of the other kinds. The result of these experiments seems to show that neither the yeast plant nor the bacillus alone will make as good bread as both together; that either without the other will produce alcoholic fermentation and cause bread to rise; that the bacillus is rather more efficient alone than the yeast. Further experimentation is projected along the same line, since no one set of experiments can be regarded as conclusive.

— "The influenza is once more in the air," says the *British Medical Journal*, "wafted hither and thither throughout the habitable world, a formidable, disabling, and fatal pandemic. Once more we are urgently asked on all sides, 'Have we a specific? Can we offer a cure?' It is the old delusion and the everlasting and unreasoning, but excusable, impatience for the miraculous and the impossible.. 'Disease comes by Providence and goes by medicine;' that is a durable and popular formula. Of specifics for sale there are, of course, a legion. To sell them is the business of the quacks; the Matteis, the Holloways, the Morrisons abound in specifics. There are a dozen available for cholera, for typhoid, for small-pox, for hydrophobia, for carcinoma — all equally plausible and equally useless except for commerce — and why not for influenza? But is there a specific for any disease? It is more than doubtful. The more we know of the nature and cause of disease, of its origin and life-history, the less we are inclined even to expect the discovery of specifics. Disease we know not as an entity, an enemy to be struck down with a club, or to be expelled by a drug, but as a process, the change of tissues and of fluids, the growth of a microbe, the proliferation of a cell, the secretion of a virus. We can modify the processes, we can lessen their virulent products, we can fortify against their worst effects; we can aid the evolution and perhaps guide it to health; sometimes we can arrest it; and often we can anticipate it. Thus we know how to ward off many diseases. Cholera, typhoid, small-pox, hydrophobia are enemies whom we can meet at the gate and forbid their approach. Deaths from either of these preventable diseases are, for the most part, violent deaths, inflicted by the ignorance of the people, the neglect of the sanitary authorities. *Populus vult mori.* In their search for specifics they parley with the enemy and lose their lives. Of influenza we know less than of most other infections; it is aerial, communicable from person to person, and along the lines of travel. For it, as for scarlet fever, we have only isolation as a preventive and palliatives as a treatment. Perhaps one day we shall know more; but there does not seem any likelihood of the discovery of a specific, and judging from numerous analogies it is far from certain that there is in this any ground for reproach. At any rate, it comes badly from a public and from a generation which is content to leave Great Britain without even one Institute of Preventive Medicine, and which is left to an appeal for funds from a Lister and a Roscoe to found such an institute — in which lies a chief hope for further life-saving and the advance of preventive and curative knowledge — while millions are lavished on weapons of destruction, or the more obvious means of charitable relief to physical suffering; and finally on the purchase of fraudulent 'specifics.'"

— The Rain Convention at Millers, South Dakota, was largely attended, and as a result it is believed that twenty counties will accept the offer of a Kansas artificial rain company to produce rain during the crop season at $500 a county, on the understanding that if there is no rain there will be no pay.

— Professor S. Ward Loper, last year lecturer on biology and geology in Trinity College, Hartford, and later connected with the United States Geological Survey in Colorado, has been appointed assistant to the Board of Management of the United States Exhibit at the World's Fair. He will select and classify fossils.

— It is expected that the Spicer Library of the Brooklyn Polytechnic will be catalogued and opened for sudents by May 1. $10,000 had been expended for books and nearly 10,000 selected volumes have been placed upon its shelves, comprising the latest works in philosophy, law, history, science, and general literature. The entire cost of the new building, including land and equipment, has been estimated at $350,000.

— The next meeting of the New York Section of the American Branch of the Society for Psychical Research will be held at Room 10, Columbia College, Law Building, Wednesday, Feb. 10, at 8 P.M. Professor William James will preside. The programme will be as follows: 1. Routine business. 2. Address by Professor James, on the Census of Hallucinations. 3. Report of some experiments in automatic writing, by B. F. Underwood (to be read by R. Hodgson, secretary of the American branch). There will be no admittance except by ticket. Special tickets are sent for members and associates. Other tickets, each of which will admit three persons, will enable members and associates to introduce their friends. Extra tickets may be obtained by members or associates on application to the secretary of the section, J. H. Hyslop, Columbia College, New York.

— The New York *Tribune* states that among the many proposed additions to Columbia College is a new school, to be known as the School of Pure Science. The announcement has met with the approval of the many friends of the college. Up to the present time the greater part of the scientific work has been done under the direction of the faculty of the School of Mines. In the new school the course will be three years, and will lead to the degree of Doctor of Philosophy. A student in the School of Arts will be able to spend his senior year in that department, take the degree of A.B., and at the end of the second and third years, respectively, in the new school, take the degrees of M.A. and Ph.D. The faculty in the School of Pure Science will be made up principally of the teachers in the School of Mines. The college proper will name a department, in accordance with the recommendations of Professor Charles F. Chandler, dean of the School of Mines, where pure scientific research can be carried on.

— The floating of the particles of cloud or fog, Herr von Frank of Graz seeks to explain (*Nature*, Jan. 14) by the presence of an envelope of aqueous vapor. As an approximate average value for the diameter of droplet with envelope he gives 0.7 mm. Supposing one cubic metre of cloud to hold 3 grammes of water, there would be an interval of 0.2 mm. between the envelopes. When clouds pass over the sun, the shadows of objects are perceptibly lengthened when the darkening occurs, and the author attributes this to refraction by the vapor envelopes. Again, it is difficult to see how water droplets in the form of cloud or fog could exist at such various temperatures, did not the vapor envelopes, as bad conductors of heat (compare Leidenfrost's drops), guard the droplets to some extent from evaporating and freezing. The minute particles must soon be dissipated by the sun's rays, if they were not in a kind of spheroidal state. This heating expands the envelopes, so that the cloud tends to rise; and various phenomena in nature may be thus explained (e.g. the rise of mist in Alpine valleys). Once more, liquid droplets have been observed (by Assmann) floating in air of — 10° C°. On meeting a solid body these froze to ice-lumps without crystalline structure. Here, according to Herr von Frank, the vapor-envelopes prevent freezing till they are ruptured by the solid; the droplet thus loses the bad conductor of heat which protected it, and solidifies so quickly that no crystals can form. The author supposes that with much aqueous vapor in the air larger drops form, the clouds floating lower; with less aqueous vapor, the drops are smaller and the clouds higher; the thicknes of envelope, however, being the same for large and small drops under like conditions of temperature and pressure.

— A despatch to the New York *Tribune*, dated San Francisco, Jan. 24, states that H. W. Turner, a geologist of Washington, D.C., who for two years past, under the auspices of the California Division of Mining Geology, has been exploring the gold regions of the Sierras, arrived there the day before. Mr. Turner obtained from a gulch at Cave City, Calaveras County, a meteoric stone that will excite no little interest in the scientific world. It is almost as large as one's fist, and around a good portion of it is a solid film of gold. In one place the gold shows for about an inch square. Hitherto, in all discoveries, no meteoric iron has been found in connection with gold. "It demonstrates," Mr. Turner says, "that there is gold in the worlds of space from which meteoric iron has fallen. The specimen will be boxed and sent to Washington. Other pieces will probably be forwarded from Calaveras. I have examined it very carefully. It is extremely tough, and it is almost impossible to break it. In my opinion it has fallen from one of the stars. This demonstrates that there is gold in some of the stars, at least. I shall send this piece to the Smithsonian Institution."

— In the *Repertorium für Meteorologie* (Vol. XIV. No. 10), M. E. Berg discusses the frequency and geographical distribution of heavy daily rainfalls in European Russia, excepting Finland and the Caucasus. The observations, says *Nature*, refer to the years 1886–90, a rather short period; but in previous years there were not sufficient stations for such an investigation. The paper deals exclusively with falls of between 1.4 and 3 inches, distributed according to months, for the various governments of the empire. The results show that the frequency of heavy falls is subject to considerable fluctuation from year to year. The regions of greatest frequency occur on the south-east coast of the Crimea and the extreme south-west of the empire; on the eastern side of the Dnieper, the region extending to Smolensk and further northwards is also subject to very heavy falls. The northern limit of daily falls of over 3 inches, so far as relates to Central Russia, is the Government of Moscow. The yearly range of frequency reaches a maximum in summer, and, except in the south-eastern districts, the frequency in autumn is greater than in spring. In July and August the great falls extend over very large districts, and at other seasons are generally regulated by the course of the barometric depresssons. The following is the average yearly frequency of the heavy falls for the whole empire, arranged according to seasons: winter, 0.8; spring, 14.3; summer, 106.4; autumn, 20.8. The maximum amount which fell in any day was over 8 inches, in Bessarabia.

— Thomas Whittaker has just ready a second edition of St. Clair's "Buried Cities and Bible Countries," the work on Palestine exploration that was well received last fall.

— E. & F. N. Spon & Co. expect to have ready very shortly the second edition, revised and enlarged, of "The Maintenance of Macadamized Roads," by T. Codrington; also the second edition, revised and enlarged, of "The Municipal and Sanitary Engineer's Handbook," by H. P. Boulnois.

— The prospectus is issued of a *Forstlichnaturwissenschaftliche Zeitschrift*, an organ for laboratories of forest-botany, forest-zoology, forest-chemistry, agriculture, and meteorology. It is to appear monthly in Munich, under the editorship of Dr. Carl Freiherr von Tubeuf; the first number is announced for the current month.

— A work on the great earthquake of Japan, by Professor John Milne and Professor W. K. Burton, is now in the press at Tokyo. It will be illustrated by 25 large photo-plates. For the sake of comparison, there will be two plates showing on a small scale the effects of earthquake in Italy and other countries. All the plates are to be on the finest quality of Japanese paper.

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The Exchange" column is likewise open.

For Advertising Rates apply to HENRY F. TAYLOR, 47 Lafayette Place, New York.

A RECENT ANALYSIS OF WILL.[1]

THE promise made by Professor Baldwin in the preface to his first "Handbook"[2] has been fulfilled. The expectation aroused by this promise has perhaps been more than gratified since in the "Psychology of Feeling and Will" we have the same rigorous scientific treatment which characterized the former volume, applied to subject matter which, for reasons now known to be suicidal, has been worked over for college text-books with far less care and satisfaction than the strictly intellectual operations. It must be a source of congratulation to teachers of psychology to know that we are now having given us year by year psychologies which deal with the stubborn complexities of mind from a standpoint that bids fair to give us soon, if it has not done so already, a veritable "New Psychology."

Taking the old method at its true worth and retaining the sum-total of valuable results it has given, it is still evident that the "natural science point of view" has been so fruitful in its construction of psychological data, has so modified old conceptions, has in fact so changed the whole face of psychological procedure, that nothing short of "New Psychology" can briefly characterize these consequences. The volumes of both James and Baldwin will, however, have their real value for teachers, not only as psychology, but as affording an ordered body of scientifically determined laws necessary for anything like fruitful philosophical construction. The data of philosophy must come from science as positive, and the scientific data given up by psychology are, it is clear, peculiarly valuable as a contribution to the conditions necessary for serious philosophizing. Rational interpretation, aided by "the judicious use of hypotheses," is necessary to complete the full survey of mind, but presupposes, if it is to be of genuine worth, previous empirical investigation. Upon such investigation is based "the possibility of a psychology, which is not a metaphysics, nor even a philosophy."

Written under this conception is Professor Baldwin's "Handbook." It is replete, however, with latent suggestions which take one immediately over into the philosophical field. Such suggestions when formally stated are to be found in the small print, which immediately follows the strictly psychological analysis and discussion.

Peculiarly rich in suggestion for ethical construction has seemed to me the author's discussion of "Will," and I desire, in brief review, to dissect out of the body of the analysis the facts which have ultimate bearing on the question of "Freedom." For whether solvable or insolvable in any ultimate sense on psychological grounds every one must admit that the weapons of analysis whereby the complex problem of "Free-Will" may be reduced to intelligible form are in the hands of psychology. Even if we reach no satisfactory solution, it is at least a gain to know clearly what the elements of the problem are. It is natural enough, therefore, that with every attempt to throw new light on the underlying elements of volition, the old sore of freedom should be reopened. As long as philosophy has life, an acknowledged fundamental question cannot remain passively unsettled; philosophy cannot be held in check by external prohibition; it moves with an inner life of its own.

Sidgwick recognizes this in his return to the question of freedom,[3] claiming, as he does, that, although "complete mutual understanding will never be reached until we have reached complete confutation of fundamental errors," yet "a diminution of the amount of misunderstanding . . . especially on fundamental points," is an end in itself worth striving for. What Professor Baldwin's discussion has accomplished in the interests of this desideratum of diminished misunderstanding, let us see.

Chapters xii. and xiii. discuss, under the general title of the "Motor Aspects of Sensuous Feeling," first, "the motor consciousness; second, the 'stimuli,' to involuntary movement." As a fundamental law of the motor consciousness we have stated what is called the law of mental dynamogenesis, viz., "that every state of consciousness tends to realize itself in an appropriate muscular movement." The general conclusion reached on the reactive consciousness is that this "consciousness, *per se*, is simply consciousness of nervous reactions and memories of such reactions or of their elements. As far as there is a consciousness of self in reflex attention, it is an objective felt self rather than a subjective feeling active self. Whatever ground may be found subsequently for such an active executive self, we find no such ground here" (pp. 293–4). This conclusion is corroborated by a reference to certain well-known hypnotic phenomena in which power of choice is wanting and the consciousness of the patient becomes entirely reactive.

Stimuli to involuntary movement are next analyzed and discussed. "By stimulus is meant the affective experience of any kind which tends to issue in conscious motor reaction" (p. 295). Such stimuli fall under one or the other of two great classes: (1) organic, (2) extra organic. In this connection (p. 204) is found the differentiation of stimuli as impulsive or instinctive. Sensuous impulse is "the original tendency of consciousness to express itself in motor terms as far as this tendency exists apart from particular stimulations of sense" (p. 307). On the other hand, "instincts are original tendencies of consciousness to express itself in motor terms in response to definite but generally complex stimula-

[1] "Handbook of Psychology: Feeling and Will," by James Mark Baldwin. Henry Holt & Co., New York.

[2] "Senses and Intellect."

[3] Mind, October, 1889.

tions of sense; i.e., they are inherited motor intuitions" (p. 311). Nor must it be forgotten that all these classes of stimuli have meaning for the reactive consciousness because they have a "feeling aspect." "An idea simply as an idea — if such could be realized — might not react in movement; but the simple presence of an idea in consciousness is itself a feeling, and only in as far as it affects us does it move us" (pp. 313–314). "Affects," therefore, is the expressive term to be applied to all stimuli to involuntary movement.

In chapter xiv., ideal feeling, in its motor aspects, is the subject of discussion. Here the stimuli have a characteristic wanting to those previously considered, viz., the element of intention. The "end foreseen" illuminates and directs consciousness in company with the ever-present stimulus of "interest." Professor Baldwin finds that "interest in an object," "emotional excitement," "idea-motor suggestion,"[1] "ideal pleasure and pain," are the general stimuli to voluntary movement. The genetic aspect of mental life — the organic connection of higher with lower in mental development—here finds illustration in the reappearance of "affects" as stimuli. In lines worth quoting we are told, that "the psychology which separates volition from reaction so sharply as to deny any influence upon the will to other stimuli than pictured ideas, is false. The conditions back of an act of choice are never limited to the alternatives between which the choice is made. There is beneath it all a dumb, unexpressed mass of affects — organic partially — felt tendencies outwards, which give coloring to the whole process" (pp. 319–320). This is interesting as a preliminary warning of the complexity to be met when we come to the fundamental problem of choice and its conditions; for it is complexity such as this which makes free-will the Gordian knot of moral philosophy. Analyze and elaborate what is known, as best we may, and there is yet left over a residuum of unreduced complexity sufficiently great to introduce a precarious element into our best results. To snatch certainty out of the hands of uncertainty, other considerations than those purely psychological may be necessary; it may be necessary, as in Professor James's case, to adopt a belief in freedom on ethical grounds. In the graphic language of James, "taking the risk of error on our head, we must project upon one of the alternative views the attribute of reality for us; we must so fill our mind with the idea of it that it becomes our settled creed."[2]

Passing by the analysis of "desire," with its ethical suggestions all along the line, we come to the author's definition of "motive," as "any influence whatever which tends to bring about voluntary action" (p. 332). Motives may be either ends or affects, while ends alone give definite lines of guidance where choice is made.

From the exploration of the springs of voluntary activity, the author passes to the nature of such activity, finding that it is always characterized by a feeling of consent or feeling of effort. All effort feeling is one of two kinds — either positive or negative: effort to do or effort not to do. Fiat of will is positive effort; neget, the negative. Three factors in the development of voluntary movement are stated: "(1) Voluntary attention to a presentation, which, in turn, stimulates a native muscular reaction; (2) voluntary attention to a presentation of movement, which stimulates the movement presented; (3) voluntary attention to an end for which a muscular reaction is a necessary means" (pp. 343–4). These come to light as a result of the analysis of the fiat and neget into their elements; and this examination gives ground for the important claim that "the entire question as to what volition is, is accordingly thrown back upon an investigation of the exercise of voluntary attention"[3] (p. 342).

Chapter xiii. introduces matter bearing from the very beginning more directly on the problem of freedom; the whole field is canvassed with a minuteness and comprehensiveness which makes the discussion a model of what psychological investigation should be. You feel at once that Professor Baldwin's mental constitution has no toleration for vague thinking, and that his style has a scientific sharpness about it that never admits of doubtful interpretation. The chapter throughout is characterized by a richness of ethical suggestion such as one rarely meets in text-books on psychology. Philosophers of Dr. Johnson's type, with their "we're free and there's an end on't," would learn not a little about the inner character of that freedom if they were willing to do the clear thinking which Baldwin's book makes possible.

Baldwin emphasizes with James[4] the absurdity of a conception of "motives" only too common among philosophical philistines. The conflict of motives is not a conflict between separate ideas with a distinct activity of their own, each exploding its own gun to compel submission from the others. Such a conception is worse than imaginary. "A motive is nothing in itself. It is only a name for a partial expression of the nature of the agent. Consequently motives can in no sense be considered as forces which expend their energies upon the will or which fight each other" (p. 353). Again, "how can they be conceived as separate entities contending in a theatre which is cold stone to all of them? Rather they are all vital elements in the functional synthesis of a living consciousness."

Another essential point is emphasized, namely, that when we penetrate to the inner nature of volition we find that it carries with it the act of attention (p. 351). This reminds one strongly of James's assertion that the real question of fact in the controversy on free-will relates to the "amount of effort of attention or consent" which could be given at any one time.[5] The role played by attention in deliberation and choice is of fundamental importance. Deliberation is a process of examination and comparison,— it is the searchlight of the mind illuminating the field of consciousness, bringing clearly into view alternative or incompatible desires,[6] and comparing their relative degrees of desirability prior to the act of choice which is the termination of the process: with choice the final fiat has gone forth, deliberation is at an end, and the deed is potentially done. "A resolve involves all the elements of a motor fiat except the word 'now.'"[7] Of the two great classes of motives, "affects" and "ends" involved in deliberation and choice, superior volitional worth is given to "ends." These are the more objective data before the eye of deliberation. "It is only by strengthening the influence of particular ends that effects enter." In fact, "what actual volition is concerned with is therefore ends, and ends only." If this be so, it is important to learn how an end passes into volition.

Baldwin's answer to this question is like Hodgson's.[8] The picturing of ends is a thinking process: it is an ordinary apperceptive act by which new elements are taken up into the old by a larger integration, the process being one of ab-

[1] cf. James's "Psychology," Vol. II., p. 522.

[2] "Psychology," Vol. II., p. 573.

[3] cf. James's "Psychology," Vol. II., p. 561.

[4] "Psychology," Vol. II., p. 569.

[5] "Psychology," Vol. II., p. 571.

[6] Mind, April, 1891, p. 170; "Free-Will: An Analysis," by Shadworth Hodgson.

[7] James, Vol. II., p. 561.

[8] April number of Mind, 1891, p. 171.

sorption and adjustment. "The attention moves throughout the series of elements, grasping, relating, retaining, selecting, and when the integration it effects swells and fills consciousness — that is the fiat" (p. 355). That is to say, the decisive point is reached, the rending strife is over, when the distracting character of the elements has been subdued, the unsettled claims satisfied, and the "attention gets its hold upon its integrated content as a grand related situation."

It is necessary to pin the attentive act down still closer. What can attention do in the matter of initiation of motives? Is attention unmotived? Is it independent of the internal and external conditions of endowment and environment? Professor Baldwin replies in the negative: an analysis of the two general classes of "apparent initiation of motive intensity"— cases of involuntary attention and cases of deliberation — renders an affirmative answer untenable. Strengthened intensity in the former cases is easily shown to be involuntary; in the latter, "as soon as any such preference comes in — any physical, mental, or emotional motive for wishing to intensify this particular alternative — then my choice is already made and I am fooling myself in thinking that I am reaching an unbiased decision."

Consequent upon these preliminaries comes the author's formal statement of the problem of freedom, in which he unfolds with great clearness of thought and transparency of expression the following four alternatives: (1) indeterminism, (2) external determinism, (3) immanent determinism, (4) freedom as self-expression. The contingent or indeterministic view, with its theory of unconditioned choice, meets with a very summary but warranted rejection. It is not only crudely unpsychological, but defeats the very end in whose interest it is projected; moral responsibility has the very ground cut from under its feet on any such theory; the conception of an agent whose voluntary expression involves moral judgment because he is agent, is emptied of all meaning. Professor Baldwin gives us here nothing new — nor was it necessary. This controversy has already been "thrashed out to the very last fragments of chaff."[1]

The external deterministic are all those who explain volition in terms of natural causality, and thus consider the problem of volition a problem in physical dynamics. "Motives are forces in reference to one another, effects in reference to the brain, in which they have their causal support; volition is the consciousness of the outcome of a conflict of forces" (p. 370). The objection to this theory is that it floats in the air. To give it weight, an assumption is necessary, which neither science nor philosophy can substantiate. The theory assumes the possibility of a continuous movement under natural causality across the physical into the mental world. Whatever may be believed as to a "uniform psychophysical connection," there is no warrant for assuming that consciousness is an epi-phenomenon. So, too, there is no legitimate ground for believing motives to be mere natural phenomena. Baldwin is as positive as Green, though from a very different standpoint, that a motive is vastly more than a natural phenomenon. As to moral action, therefore, that view of it is false which supposes "that the motives which determine it, having natural antecedents, are themselves but links in the chain of natural phenomena."[2]

The analysis of motive exhibits three important results: 1. Choice is never motiveness. 2. The end chosen is always a synthesis of all present motives, and is adequately expressed by no one of them. 3. This synthesis is an activity *sui generis:* it finds no analogy in the composition of physical forces. With these results clearly in view, he finds that "freedom, therefore, is a fact, if by it we mean the expression of one's self as conditioned by past choices and present environment." "Free choice is a synthesis, the outcome of which is, in every case, conditioned upon its elements, but in no case caused by them"[3] (p. 373).

To read Baldwin's chapters on the will (for these were well worth the space of a separate review) is to feel that a mind of admirable scientific temper has been at work throughout. Approaching the phenomena of mind from the naturalist's point of view, he has guarded against the tendency, all too common in these days, of trying to drive the principle of physical causality through a multitude of facts, naturally and philosophically recalcitrant to such treatment. The great lesson of his two volumes is, that in psychology the application of scientific methods and canons to mental phenomena affords no results which a cautious metaphysic may interpret as casting discredit on spiritualism in philosophy.

ROGER B. JOHNSON.
Miami University, Oxford, Ohio.

[1] Jonathan Edwards, Day, etc.

[2] Green's "Prolegomena to Ethics," p. 93.

[3] cf. James, Vol. II., pp. 571-2.

SIR GEORGE BIDDELL AIRY.

THE cable has just flashed across the ocean the announcement of the death of Sir George Biddell Airy, the eminent astronomer of England. He was born on the 27th day of June, 1801, at Alnwick, in Northumberland, and had, therefore, just passed the half-mile post that would bring him to his ninety-first birthday.

Sir George Airy's life and work will always be looked upon as one of the most prominent pillars in the astronomical edifice erected in the nineteenth century. He had almost lived to see what had been done in that hundred of years. He had stood upon the pile of débris thrown up from the foundation, and looked down upon the formation of a structure, little dreaming that he would live to see the finishing touches put upon an edifice to which he had added so much material.

Airy was educated first at two private academies, Hereford and Colchester. From the latter, at the age of eighteen, he entered Trinity College, Cambridge. Three years afterwards he was elected to a scholarship. In that college he developed his remarkable mathematical ability, graduating as Senior Wrangler. His degree of M.A. was taken in 1826, and, with it, he was elected as Luscasian professor at Cambridge. Illustrious philosophers like Barrow and Newton had preceded him as occupants of that historic chair. Just previous to his election to that chair he published his mathematical tracts on the "Lunar and Planetary Theories," "The Figure of the Earth," etc., and "The Undulatory Theory of Optics."

Professor Airy, having been installed in the position just mentioned, followed his appointment with a series of popular lectures upon experimental philosophy, which were delivered with remarkable effect, and which greatly enhanced his scientific reputation. The university, recognizing in him one whose investigations were of a high order, elected him two years afterward to the Plumian professorship. This election gave him charge of the Cambridge astronomical observatory, and now is inaugurated an epoch in his life that is to elevate him to one of the highest positions held by English scientific men

Having been placed in the position above cited, Professor

Airy began those great improvements in the methods of calculating and publishing the astronomical observations made, which have led other observatories to take copy after him. Airy was a methodical man, a professional and a business man. He made his work conform to a scheme laid out the year before, and that plan was strictly followed. His work as an astronomer and a calculator is valuable, because it is unbroken and comparable. The astronomical instruments that have so long stood within the walls of Cambridge Observatory were made after his own plans and under his own directions.

In 1835 Professor Airy, then in his thirty-fourth year, was appointed Astronomer Royal. For forty six years he filled that position with marked ability. Under his master-mind it is needless to say that the astronomical observatory at Greenwich was completely changed. He placed the manner of reducing the observations upon a more satisfactory basis, and equipped the observatory with instruments of a higher order of precision. In the year 1850, under his guidance, a new meridian circle was erected. It has an object glass of eight inches aperture and eleven feet six inches focal length. In 1855, at his earnest solicitation, a large equatorial telescope was placed in the observatory.

Professor Airy was a man that not only combined the philosopher with the mathematician, but was one that had an inventive mind as well. This may be seen in the many forms of astronomical instruments and their accessories due to his very active brain. The value of the observations made by him during his occupancy of the position of Astronomer Royal at Greenwich, rests not only upon their accuracy and dispatch in being published, but on their continuity. This may be seen in his reduction of lunar observations from 1750 down to a late date, a most valuable series of observations.

Airy was a man in whom his government had the utmost confidence when it came to deciding questions of grave import. He was the chairman of the royal commission empowered to supervise the delicate process of contriving new standards of length and weight, the old standards having been destroyed in the burning of the House of Parliament in 1834. He was called in consultation soon afterwards in respect to removing the disturbance of the magnetic compass in iron-built ships. He thereupon contrived a mechanical combination which has been universally adopted. His researches on the density of the earth, his fixing the breadth of railways, his care in the equipment of the British expedition to observe the transit of Venus, and the reduction of the observations after having been made, — all voice the great confidence placed in him by his countrymen, and his worth as a practical astronomer.

The writings of Sir George Airy cover a great deal in the field of philosophical and mathematical thought, and are thorough in their discussion of each subject. His pen was ever busy, and one has but to turn to the volumes of the Cambridge Transactions, the Memoirs of the Royal Astronomical Society, to the *Philosophical Magazine*, and the *Athenæum*, to find its fruits. But in the volumes issued from the Greenwich Observatory we find the great life-work of Sir George Airy. They are the polished stones, the finely carved pillars that have been used in building up the astronomy of the nineteenth century. His principal works, which have become books of reference, are: "Gravitation," "Ipswich Lectures on Astronomy," "Errors in Observations," "Figure of the Earth," "Tides and Waves," "Sound," and "Magnetism."

One whose reputation as a man of such scientific attainment as Sir George Airy has deservedly received recognition, both from his own country and abroad. He has received the Lelande gold medal of the French Institute in honor of his important discoveries in astronomy. For his successful optical theories he was awarded the Copley gold medal of the Royal Society. The royal gold medal of the same society has been given him in return for his tidal investigations. Twice the gold medal of the Royal Astronomical Society has been given him — first, in return for his discovery of an inequality of long period in the movements of Venus and the earth; second, to reward him for his reduction of the planetary observations. He has been enrolled among the most honored members of the Royal Astronomical Society, of the Cambridge Philosophical Society, and of the Institute of Civil Engineers. For many years he has been among the foreign correspondents of the Institute of France, and other scientific societies on the continent. He has secured the honorary degree of D.C.L. and LL D. from each of the great universities of Great Britain — Edinburgh, Oxford, and Cambridge. In May, 1872, he was gazetted a Knight of the Bath.

When the years shall have passed into centuries, and coming astronomers are searching the records for valuable data to be used in the discussion of questions in astronomy, the observations and results determined by Sir George Biddell Airy will be found of the highest value.

GEO. A. HILL.

STRUCTURE OF THE TRACHEÆ OF INSECTS.[1]

MR. LACHLAN'S article on insects in the "Encyclopædia Britannica" reproduces Blanchard's error of a double chitinous wall for the tracheæ with a spiral thread between. Blanchard and Louis Agassiz superadded a peritracheal circulation of blood. Joly's refutation of this view, in 1850, failed to give the real cause of the error: this was not, as suggested by him, due to bad injecting; but it resulted from observing insects when moulting. At time of moulting the trachea contains the old chitinous wall, dark and enclosing air, and surrounded with exuding fluid between it and the new chitinous wall; thus the appearance of things is much as described by Blanchard, who mistook the exuded fluid for circulating blood, and also mistook a temporary state of matters for the normal state.

The view published by me in the *American Naturalist*, in 1884, that the spiral thickenings of the trachea are really crenulations, channel-like transverse folds open outwards (i.e., away from the lumen of the trachea) by a slit or fissure, was supported by indirect evidence, and needs to be enforced so as to leave no doubt. Miall and Denny, in their monograph on the cockroach, write as if they had been able to unroll the spiral like that of a vegetable trachea, without tearing the connecting membrane, and copy Chun's very inaccurate figure, which ascribes a free continuous spiral thread to the trachea of insects just as we find it in the plants.

A re-examination of the case brings out the singular result that the whole machinery can be distinctly seen by the microscope to be such as I have described it. The profile of a medium-sized trachea of any insect can be easily seen to be grooved like the edge of a screw: all the more clearly if the trachea is slightly stretched under the cover-glass. In the living insect we may observe that the resiliency of the transversely chanelled walls responds to the muscular contraction

[1] Abstract of a paper read by G. Macloskie before the American Association of Naturalists, Dec., 1891.

of the thorax and abdomen, so as to assist the tidal movement of air outwards and inwards.

I may add that one of Chun's figures (copied in the paper in *Am. Nat.*) correctly represents the spirals of *Eristalis*, giving even the external slits, highly magnified; but he misinterprets the slits, and takes them to be longitudinal ridges on what he supposes are solid threads. I have also pleasure in learning that my young friend, Professor H. T. Fernald of Pennsylvania Agricultural College, after reading my paper in 1884, stained and cut fine sections of *Passulus cornutus* and thus shows the spirals to be a set of hollow grooves enclosing some of the stained hypodermis which secretes and surrounds the tracheæ.

Princeton College, Jan. 21.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

A Lightning Stroke.

ON the 30th of May, 1881, a party of ladies and gentlemen went in an omnibus from Washington to the country seat of a friend (H. C. Metzerott's), distant nine miles, in Prince George's County, Md.

During the afternoon the party was seated on the spacious veranda of the dwelling, the horses and omnibus standing on the lawn immediately to the front.

Suddenly a few clouds gathered, and, before any rain fell, a severe and sudden clap of thunder startled them. At the same instant a flash or streak of lightning descended and ripped apart the south-west corner of the roof of the frame carriage house standing alone about two hundred feet distant, descended down the sheathing to midway of the west, or end, wall of the carriage house, then at right angles apparently to the centre of the wall where the clap-boarding was ripped and shattered; then struck a brass-tipped pair of shafts standing near the north-west angle, shattering the right-hand shaft about midway, where a strip of iron covered with leather was placed to serve as a stay for the breeching strap; then apparently passed down and out at the floor by the closed door of the carriage house, where it was plainly seen by all the company moving along rapidly in small coils or circles up the road leading to the veranda, to the hoofs of the horses, playing around them with great velocity, and then apparently dissipated, no one could tell where. The horses were greatly agitated, fairly trembled, but did not move; and most of the company on the porch experienced a tingling, stinging sensation, but none were stunned. The sky soon cleared. J. H.

Washington, D.C., Jan. 25.

Traumatic Hypnotism.

THE case recently stated of a lady thrown into a hypnotic condition by being thrown from a carriage, in which condition she said and did certain things of which the next day she was entirely unconscious, brings to mind a fact that occurred near this place. Two lads of fourteen and sixteen went out to feed the stock. Coming near a young, almost unbroken colt, they leaped on his back. The animal started in a wild run for the barn, and dashing in at a low door struck the two lads violently against the beam that formed the top of the door. The door being very low the blow was not on the heads but the chests of the boys, sweeping them from the colt's back to the frozen ground. The elder lad sat behind his brother, and was thrown heavily to the ground, striking the back of his head, his brother falling upon him. Both lads rose; the elder rubbed his head, looked about, went into the barn and completed his evening tasks in an orderly manner, replying to his brother when addressed. They went to the house, and the lad warmed himself by the stove, went to the table, ate a lighter supper than usual, and replied intelligently when spoken to; but his eyes were dull and had a dazed, half-conscious look. After supper he sat by the fire for some time, laughing aloud once or twice "at nothing"—than went to bed as usual. The next morning it was found that he knew nothing of any event after the instant of jumping on the colt's back, and seeing it dash off toward the barn. He had not felt the blow, nor been conscious of the fall, or of any subsequent words or acts, until he arose the next morning, but his conduct and appearance had been normal, except the causeless laughter and the dull look of the eyes. In the case of the lady flung from her carriage, she went into a druggist's, asked for water and a clothes-brush to renovate her dress, said she was not injured, needed no help, etc. Thus she said and did things suitable to the conditions of her accident. The lad, on the other hand, continued the course of action which he had begun before his fall, feeding the stock, etc. His acts during the evening were acts of habit, and such as he repeated every evening. Neither the lady nor the lad were dominated by any other mind, nor directed in their motions by any person conscious of, or responsible for, their state, but it seems that by reason of a blow given on the back of the head in each case, both the lady and the lad were in a true hypnotic state, and were subsequently entirely oblivious of all that had occurred while they were in that condition. JULIA MACNAIR WRIGHT.

Rain-Making by Faith.

SOME of the readers of *Science* doubtless may recall numerous memorable incidents of the administration of the genial, earnest, shrewd, and eccentric President Phinney of Oberlin. Apropos to recent articles on faith-healing and rain-making is a vivid recollection of such an incident.

Some forty years ago, on a cloudless Sabbath morning, the president walked briskly up the chapel, — there had been a distressing drouth, — and began the service with an extremely fervent prayer for rain. The prayer was long, and before it was finished the skies began to darken, and almost before the congregation was dismissed a copious rain began to fall. The suggestive fact in this relation is that President Phinney had been observed during the morning to give very watchful attention to the barometer. H. CHANDLER.

Buffalo, Jan. 25

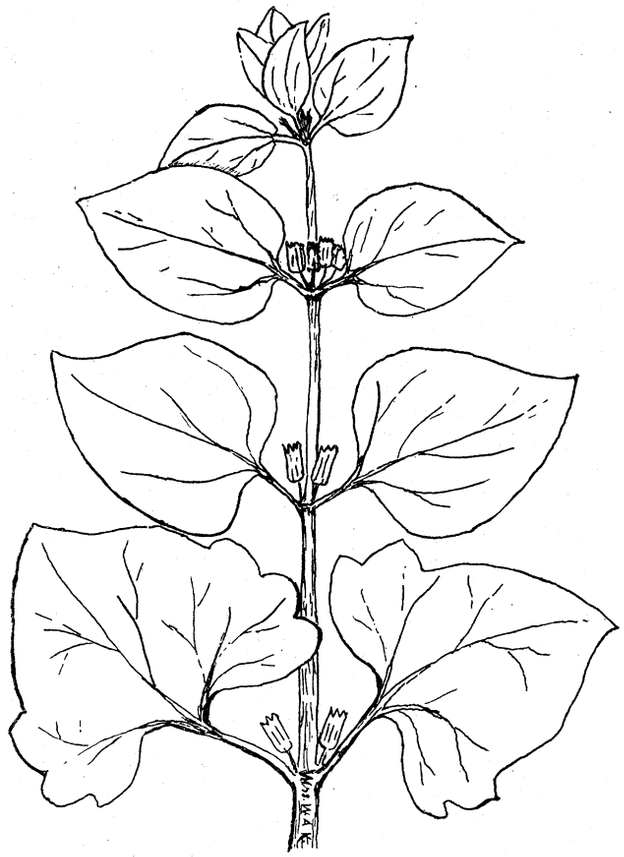
Some Curious Catnip Leaves.

AS I passed by an old deserted log cabin, where the soil was poor and barren, I noticed a bunch of catnip in an angle of the pioneer zigzag fence. So close in the corner was it, that it seemed as if it had crept there for protection. But even in its apparent retreat it was conspicuous, for vegetation generally had succumbed to the frosts of early autumn. A society for the prevention of cruelty to plants ought to be organized, I thought, for here was this little stunted looking bunch of catnip, struggling for existence, when it certainly seemed physically unable to cope with the unfavorable conditions for growth surrounding it. Poor little lonely weed, I mused, is it just that you should struggle here alone against all the hardships which put even the best dowered plants to the test? and like my humane brothers who, in order to end the misery of a poor misused horse, feel compelled to take its life, I terminated its struggles by collecting it.

The catnip (*Nepeta cataria*) has a beautiful leaf, with a rather deeply crenate margin; its upper surface has a rich, soft, downy, rather velvet-like appearance, while the deep green color is a witness of its hardihood. But the leaves on this plant, which out of compassion I magnanimously collected, were very different from the normal type; the surface was nearly smooth, and the margin of many leaves was quite entire; others were crenate only near the base of the leaf, though entire toward the apex, as shown in the accompanying illustration. Why, and wherefore, this difference in the leaves? I queried. Why have they varied from the shape recognized as the typical leaf? The little leaves themselves replied: "We are the result of poor, unfavorable conditions; we had neither strength nor vitality sufficient to

elaborate the modern catnip leaf, though we recognize its superiority over our own shape and appreciate the fact that the most advanced, progressive leaves are those most deeply notched. We are reversions to a more ancient, primitive type of leaf, like those borne by our ancestors. When our environment is such that we are starved, even at the threshhold of life, we cannot adorn ourselves with the modern improvements, now so commonly worn." "You will notice," the leaves continued, "that we grew on branches of the summer's seed-stalk. The upper part of it was already dead, but the lower portion had still sufficient vitality to send out these feeble branches; they were only able to follow in the old, old rut, worn by preceding generations, and therefore we are simply what you might with propriety denominate very old-fashioned catnip leaves."

I was much impressed by this explanation, but, even though the leaves themselves had answered my query, like Thomas of old, I still doubted.



NEPETA CATARIA.

Scores and scores of plants were questioned in regard to the cause of this variation from the normal type, and in every case the same story was told. The leaves borne by the branches of the old seed-stalk were often wholly entire, or crenate only towards the base.

All the leaves which grow on the radical shoots are perfected in their crenate outline to the apex; and, while the leaves of the radical shoots are green, even at this season (January), these "old-fashion-leaved" branches have long been frozen and dead.

All things unfold according to their environment, directed by heredity. In geologic times the ancestral hereditary force pushed on the conditions; plants and animals responded by adaptation; or, where they could not adapt themselves to their ever changing environment, they were left behind, and became extinct. The law of evolution says: "Advance with me, or fall from the ranks!" Plants and animals, races, nations and tribes, are yet falling out of rank because they cannot comply with the requirements necessary to endure or cope with the constantly changing conditions.

It took the catnip we know not how long to overstep the entire leaf; but, after studying the variation of leaves, who can doubt that the present crenate leaf is the result of evolution.

MRS. W. A. KELLERMAN.

Columbus, O., Jan. 18.

AMONG THE PUBLISHERS.

Outing readers will welcome back to its pages the now renowned world traveller and explorer, Thomas H. Stevens, who with his cycle girdled the world for *Outing*, and who has just achieved a successful expedition from the German Ocean to the Black Sea in a steam launch, despite the dangerous rapids of the Iron Gates. *Outing* for February opens with a charming description of "Cycling in Mid-Pacific," by Charles E. Trevathan, in which the author draws a pleasant picture of the natives, foliage, flowers, and the delights of wheeling over the snow-white coral roads of dreamy Tahiti.

— D. Appleton & Co. announce a new book by Arabella B. Buckley, author of "The Fairyland of Science," "Life and Her Children," etc. The title of this work will be "Moral Teachings of Science," which the author is said to have invested with special interest.

— Macmillan & Co. announce for publication early in February a practical work on electric lighting. The full title of the book is "A Guide to Electric Lighting for Householders and Amateurs," and the author is S. R. Bottone, well known by his previous books on electrical subjects. In order to make the book thoroughly serviceable to readers in this country the proofs have been read by an American scientist, for the purpose of supplying any needed explanation of merely local usage.

— Longmans, Green, & Co. have in press a work by the late Ferdinand Praeger, entitled "Wagner as I Knew Him." The book, which is the outcome of Dr. Praeger's life-long intimacy with Wagner, is a remarkably clear, sympathetic, and unprejudiced history of the man and the composer, especially valuable for its frank discussion of episodes in his life usually treated with hesitation by his biographers. Dr. Praeger had the privilege of reading Wagner's autobiography in manuscript, and thus verifying his own observations by Wagner's own statements.

— The latest publication of Professor Eben N. Horsford concerning the ancient settlements of the Norsemen in the territories of the New England States was published in large quarto size by Damrell & Upham, Boston, and bears the title, "The Landfall of Leif Erikson, A.D. 1000, and the Site of his Houses in Vineland, 1892." Leif's houses are placed on the Charles River, below the Fort Norumbega, and a short distance above Boston, Mass. The book is very profusely illustrated with photographic views and with the maps which have come down to us from the earliest explorers of the sixteenth century, and so on to the end of the nineteenth. This collection alone makes of the volume a thesaurus of cartographic informatian surpassed by no other recent publication. The amount of historic and topographic information gathered from all the earlier historians and other authorities on New England matters is enormous, and they are classed under appropriate headings, of which the principal are as follows: The Landfall, Expedition of Bjarni, Thorwald's Expedition to Vineland, and Sketch of the Thorfinn Expedition to Vineland. Then come a résumé, an appendix, and notes. This volume of 147 large quarto pages is printed with wide margins, holds 39 maps and illustrations, the typographic execution being of the most splendid. Simultaneously with the above was issued a pamphlet in a smaller quarto size, also provided with maps of the New England coast, entitled, "Sketch of the Norse Discovery of America at the Festival of the Scandinavian Societies, assembled May 18, 1891, in Boston, on the Occasion of presenting a Testimonial to Eben Norton Horsford in Recognition of the finding of the Landfall of Leif Erikson, the Site of his Vineland Home and of the Ancient Norse City of Norumbega, in Massachusetts, in the Forty-third Degree."

— The literature of South American ethnology has just been enriched by a fine pictorial publication in folio, being Nos. 1 and 2 of the second volume of the "Veröffentlichungen," issued from time to time by the direction of the Royal Museum of Ethnography

at Berlin (80 p. and 16 plates, Berlin, W. Spemann, 1891). The explorer, Dr. P. Ehrenreich, here presents his observations, studies, and experiences from July to November, 1888, among the tribes of the Araguaya River in the Brazilian province of Goyaz and those of the Puru River, a tributary of the middle Amazonas. These reports appear under the modest subtitle, "Beiträge zur Volkerkunde Brasiliens," and the illustrations in the text are just as instructive as those in the plates. Of the Goyaz tribes the Karaya were the chief object of the explorer's studies; among the Puru tribes, the Yamamadi, Ipurina, and Paumari. The accounts given of their customs and manners, implements, weapons, dances, and other merrymakings are as interesting as the specimens of their folk-lore, of which many instances are inserted. The masks used in the dances cover the whole body, and are figured on pages 35 and 36.

— Warren K. Moorehead writes, in the *Illustrated American* for Jan. 30, a most remarkable and interesting story about "New Relics of the Mound Builders in Ross County, Ohio." One of these relics, he says, is the skeleton of a man with copper helmet with antlers, and the other is a Swastika cross, oriental in character, and is one of the first finds ever unearthed to show the origin of the Indians. He says in this connection: "The discovery of four crosses, which are peculiarly oriental in character, marks a new epoch in American archæology. M. G. de Mortiellet, the eminent French anthropologist, refers to the same style of cross found by the survey, and gives numerous illustrations in his works of its occurrence on pottery, sepulchres, and monuments of Brittany, Italy, and particularly India. The Swastika was used as one of the emblems of Buddha worship before the Christian era, and may have spread later into Phœnicia. This symbol is occasionally found in Egypt and China, but, so far as the writer is aware, not in Yucatan or Mexico. A cross does occur on the Palestine tablet, but it is not the Swastika. No skeleton in the mound indicated a person of more importance than No. 248. Copper antlers, 22 × 23 inches, extended from the forehead upward. The breast and back were covered with copper plates, bear teeth, and other singular ornaments. Strings of beads lay about the ankles and wrists, while at the feet were traces of decayed sandals. The copper horns had been originally fastened to a helmet of copper, covering the skull from the upper jaw to the base of the occipital. A rough cloth skirt extended from the waist to the knees. Where the copper plates came in contact with the fabric it was well preserved. Beautiful pearl beads and large bear and panther tusks were interlaced or strung upon the front of the garment. The other skeletons were covered with shell beads, and a few copper plates and celts accompanied them."

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Wanted to buy or exchange a copy of Holbrook's North American Herpetology, by John Edwards. 5 vols. Philadelphia, 1842. G. BAUR, Clark University, Worcester, Mass.

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— "Evolution in Science, Philosophy, and Art" is the title of a book containing seventeen lectures by Professor John Fiske, Mr. Underwood, Dr. Abbott, Mr. Wakeman, and other able exponents of evolution, which is to be published immediately by D. Appleton & Co. The principle of evolution being universal, admits of a great diversity of applications and illustrations, and many which appear in this volume are fresh and striking. The scientific lectures, as in the case of that by Dr. Alleman on Optics, are often of direct practical value. These lectures when delivered before the Brooklyn Ethical Association attracted general attention. In book form they are accompanied by a letter from Herbert Spencer, and by numerous illustrations.

— The title of Tyndall's forthcoming book is "New Fragments." Among the subjects which are treated in the five hundred pages are The Sabbath, Life in the Alps, The Rainbow and its Congeners, Common Water, and Atoms, Molecules, and Ether-Waves. In addition to the popular treatment of scientific themes, the author devotes several chapters to biographical studies of the utmost interest. Among the subjects of these studies are Count Rumford and Thomas Young, and there are also chapters on Louis Pasteur, his Life and Labors, and Personal Recollections of Thomas Carlyle. Tyndall's "New Fragments" will be published immediately by D. Appleton & Co.

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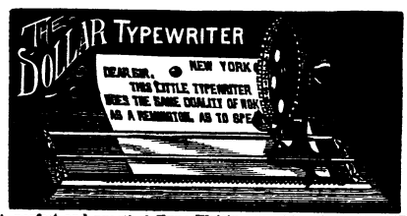

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